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THE INTERMOUNTAIN PRECIPITATION STORAGE GAGE

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ABSTRACT

A modified standpipe is recommended as a rugged, vandalproof precipitation storage gage that is relatively easy to erect. It has proved satisfactory on sites receiving 60 inches or less of precipitation during the storage season.

INTRODUCTION

Precipitation storage gages have been used since the last century (Kurtyka 1953), but have undergone considerable development and modification in the United States during the past 50 years (USWB 1959). The standpipe storage gage is now commonly used by the U.S. Weather Bureau in deep snow country. It is fabricated from 5-foot sections of 12-inch-diameter, 10-gage steel pipe. An 18-inch-long truncated cone forms the top of the gage, reducing the catch ring to a diameter of 8 inches. This gage does not require a mounting tower, but forms its own support (USWB 1959).

A gage modeled after the standpipe is now made of reinforced fiber glass. It is formed in a single $16\frac{1}{2}$-foot-tall section. Its advantages are lightness in weight, strength, resistance to corrosion, imperviousness, and ease of machining and patching (Billones 1963).

A special storage gage has been developed recently, primarily for use on rangelands, foothills, and desert areas. It has a maximum precipitation capacity of 35 inches, is only 14 inches high, and is mounted on a single 2-inch-diameter pipe (Collett and Warnick 1962).

Prior to the development of the last two gages mentioned above, the Intermountain Station designed, had fabricated, and put into use several precipitation storage gages that were a modification of the metal standpipe gage. The Intermountain modification is especially suited to use on inaccessible sites. It is less expensive to build than the metal standpipe gage, is easily erected and readily serviced, and has proved relatively vandalproof.

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[1] Located respectively at Forestry Sciences Laboratories, Intermountain Forest and Range Experiment Station, maintained in cooperation with Utah State University, Logan, and University of Idaho, Moscow.

CONSTRUCTION

The Intermountain precipitation gage is mounted on a single $3\frac{1}{2}$-inch pipe of sufficient height to project the gage and its shield above the top of the maximum expected snowpack, and beyond the reach of most vandals (fig. 1). The gage tank is 40 inches tall, 12 inches inside diameter, and is fabricated of 12 gage or heavier steel (fig. 2). (This weight of steel usually is not penetrated by .22 caliber rimfire bullets.) A cone 18 inches long, welded to the top of the gage tank, reduces the orifice to a standard 8-inch diameter. Windshield support brackets are welded to the top of the tank section, and a drain assembly is attached at the bottom (fig. 3). To reduce the likelihood that the gage tank might be drained by vandals, the valve handle may be removed except when in use, and the pipe cap over the drain may be tightened so a wrench is required to remove it.

The support pipe should be imbedded in concrete to provide a firm foundation and insure that the gage will remain in a vertical position, especially when full. Besides providing support, the concrete will prevent the pipe from rusting. Braces of angle iron may be welded to the pipe support to increase anchorage in the concrete. If the gage is found to be unstable despite these precautions, anchor cables may be attached to the three eyehooks welded near the top of the support pipe. Turnbuckles installed in these cables will aid in tightening them. (Anchor cables were found necessary on only one of five gages on the east side of the Sierra Nevada, where annual precipitation is approximately 30 inches.)

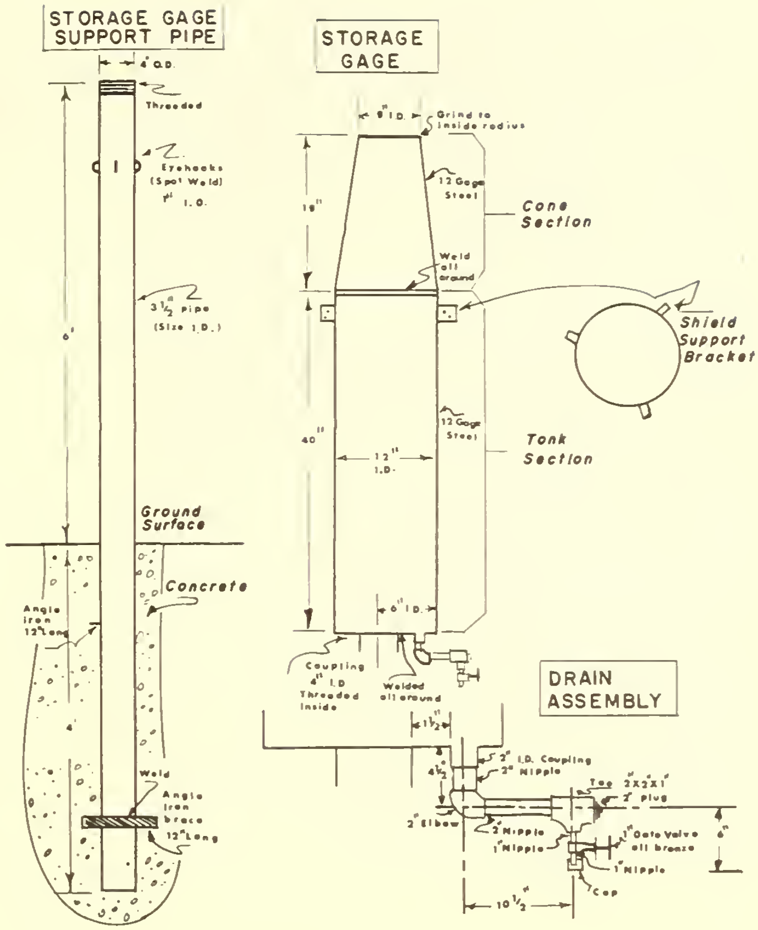
Both the inside and outside of the gage and the outside of the support pipe should be painted with rust resistant paint. Maximum radiation will be absorbed if the outside of the gage is painted black; this aids in melting any snow caught above the antifreeze solution.

To obtain a representative catch of precipitation in most locations, a windshield is required around the orifice, especially if most precipitation falls as snow accompanied with wind (Wilson 1954). A modified Alter windshield, unlike the one shown in figure 1, is now recommended for this type of gage (Warnick 1956). A windshield of this design made of fiber glass leaves is in the developmental stage.[2]

Figure 1.--The Intermountain precipitation storage gage fitted with an Alter windshield. Although not apparent in the photograph, this gage is sheltered by forest on three sides.

[2] Personal communication with Coit Manufacturing Company, Mendota, Calif., 1964.

Figure 2. -- Construction details of the Intermountain precipitation storage gage.



The storage gage may be fabricated in most local machine shops with commonly available materials. The gage can be carried to the site in easily handled units, readily assembled with hand tools, and erected. If a water supply is available, mounting the support pipe in concrete is not difficult. Only a shovel, a heavy plastic tarp, and a few bags of mixed cement, aggregate, and sand are needed.

SERVICING

A modified standpipe gage has a capacity of 90 inches' precipitation in the tank section. The capacity of the cone increases the total capacity of the gage. However, the cone section should normally function as dead-air space to trap and melt snow. In mountainous areas, where most winter precipitation is snow and where minimum winter temperatures are well below freezing, the storage gage must be charged with an antifreeze solution. Ethylene glycol is recommended in amount sufficient to protect the contents of the gage from freezing during the coldest weather expected (Kidd 1960). Also, a layer of low viscosity oil, approximately 0.15-inch thick, should float on the surface of the stored precipitation to prevent evaporation (Hamilton and Andrews 1953). A typical winter charge (antifreeze, water, and oil) will fill about 30 inches of the gage capacity, leaving storage space for 60 inches' precipitation.

Access to the orifice of the gage, for charging or maintenance, is with a stepladder. A light, magnesium, 12-foot stepladder is quite satisfactory. An alternate access, especially if the gage is isolated, or if vandalism is not anticipated, is provided by steps welded to the support pipe and gage tank (not illustrated).

This gage is recommended as a sturdy, vandalproof storage gage that is relatively easy to erect. It performs satisfactorily on any site receiving 60 inches or less precipitation during the winter storage season.

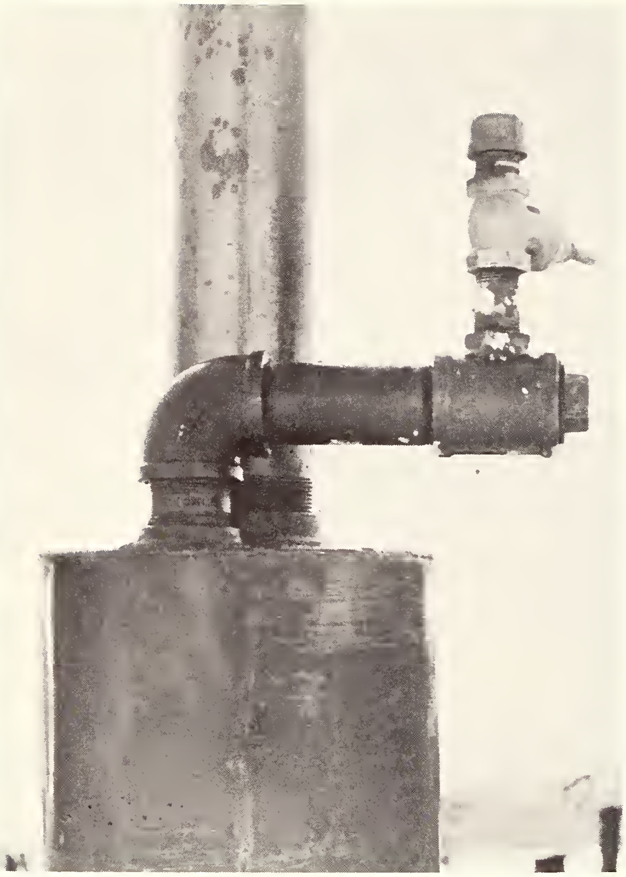


Figure 3.--Closeup of drain assembly visible on the gage in figure 1.

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